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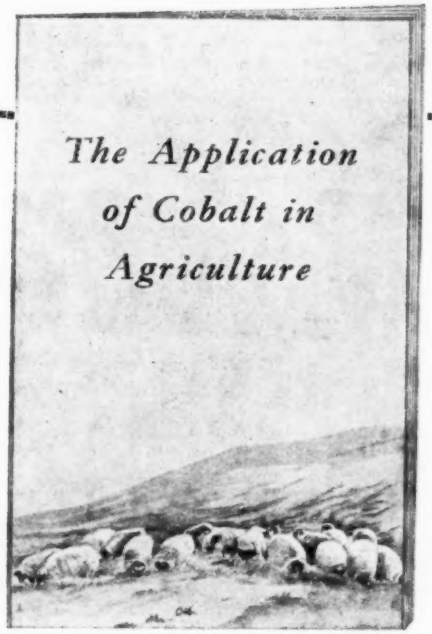

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Refresher Article No. 13

Hypocalcaemia and Hypomagnesaemia in Cattle

BY

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SUMMARY.—In an article of this nature no attempt will be made to give an exhaustive review of the literature on these two diseases; the aim will be to consider the conditions in the light of existing knowledge which has a bearing on their diagnosis, treatment and prevention.

THERE is a widespread belief that the incidence of hypocalcaemia and hypomagnesaemia in both cattle and sheep is increasing year by year. While the paucity of reliable statistics on the incidence of animal diseases makes it difficult definitely to substantiate this belief, there can be little doubt that it is well founded. It is further held that the increase in incidence is related to modern methods of husbandry and in particular to improved methods of grassland management. Here again, although it is impossible to put the hypothesis to the absolute test, field evidence tends to support it.

Although the two conditions have several features in common it will be convenient, for the sake of clarity, to consider them separately.

Hypocalcaemia

Classical milk fever has been recognised for a very long time and its clinical manifestations are sufficiently well known for it to be unnecessary to detail them here. However, its very familiarity can occasionally lead one astray and it is important to remember that not all cases of recumbency following parturition are accompanied by hypocalcaemia. A careful routine clinical examination should always be made and will serve to differentiate conditions such as acute septic metritis and mastitis which may simulate or accompany hypocalcaemia.

Hypocalcaemia occurring away from the immediate post-parturient period presents a more difficult problem in differential diagnosis. Here the clinical picture may not be so clear-cut and is more often complicated by the presence of other conditions. Thus hypocalcaemia may be exhibited as a symptom of various digestive disorders such as displacement of the abomasum, peptic ulceration of the abomasum and enteritis. Hypocalcaemia of varying degrees of severity usually accompanies toxic indigestion resulting from the animal gorging itself on concentrated feeding-stuffs such as grain, high-protein meals and cakes or apples. It may also occur from the injudicious introduction into the ration of such forage crops as fodder beet. A mild degree of hypocalcaemia frequently exists in primary acetonaemia but it is seldom that the level of serum calcium is much reduced. Conversely, ketonaemia occurs occasionally as a complicating factor in true milk fever.

Hypocalcaemia is sometimes seen in dairy cows grazing lush, rapidly growing pastures in the spring, especially if the pasture has been recently put down and consists predominantly of one variety of grass. Hypomagnesaemia is more commonly encountered under these conditions but occasionally outbreaks of straight hypocalcaemia are seen. The usual picture presented is of a fall in milk production among the high yielding cows in the herd with a few animals showing moderate to severe symptoms of hypocalcaemia which can be confirmed by blood sampling.

Transport tetany, which is apparently an acute hypocalcaemia seen in pregnant or lactating cattle and sheep which have been transported long distances by road or rail, is not very frequently seen in this country.

Aetiological Considerations. It is doubtful whether any animal disease has given rise to more speculation on its causation than has milk fever. No useful

purpose can be served by attempting to review the innumerable theories which have been put forward. The theory which has probably received the greatest measure of support is the parathyroid dysfunction theory of Dryerre and Greig (1925). At least part of their hypothesis was given the support of experimental evidence by the demonstration by Little and Wright (1925), that milk fever was accompanied by a hypocalcaemia and this led to the successful application of calcium therapy. The very success of this treatment, however, has cast doubts on the validity of the parathyroid dysfunction theory as it is difficult to understand the nature of a dysfunction which is so readily and rapidly rectified. There have recently been attempts to explain milk fever on a more mechanistic basis and Marshak (1957) has suggested that milk fever may be explained on the basis of differences between cows in the rate and manner in which the secretory cells of the mammary gland handle milk precursor calcium and transfer it from blood to milk. The demonstration by Hansard, Comar and Davis (1954) of a decrease with advancing age in the availability of calcium for exchange between blood and bone has gone a long way towards explaining the age incidence of milk fever.

That there is an important relationship between diet and the aetiology of milk fever cannot be doubted and more knowledge of this field is essential before very much success can be expected in the prevention of the disease.

The elucidation of the causation of atypical hypocalcaemias or "delayed milk fever," which is so commonly seen in the Jersey breed, presents a fascinating problem for the clinician. In many it seems to be impossible to ascertain the causation but a proportion are undoubtedly related to alimentary dysfunction. This suggests that the dairy cow at peak lactation, and particularly those of the Jersey breed, is very dependant on a constant assimilation of calcium from the gut for the proper maintenance of normal levels of serum calcium; anything which interferes with this, even only temporarily, may result in a severe drop in serum calcium and the exhibition of clinical signs.

The aetiology of hypocalcaemia occurring in cows grazing lush, rapidly-growing leys is still obscure. It is possible that the scouring which is so frequently seen under these circumstances may be a factor in the aetiology and may operate by retarding the assimilation of dietary calcium. This suggestion is lent some support by the author's observation of an outbreak of hypocalcaemia in a Jersey herd affected by "winter scour."

Treatment. In considering the rational treatment of milk fever the biochemical features must be borne in mind. Typically milk fever is accompanied by a hypocalcaemia and hypophosphataemia. The serum magnesium is usually normal or slightly raised but in complicated cases, especially where there has been a relapse to previous therapy, it may be lowered. Although the plasma phosphate levels are always lowered in typical milk fever, they usually rise to normal very soon after straight calcium therapy. It is found that in uncomplicated milk fever, satisfactory results are obtained by the intravenous injection of 3 ounces of calcium borogluconate dissolved in about 12 ounces of water. It is important to give the injection reasonably slowly—it should occupy about 5 to 10 minutes—otherwise there is a risk of death from the toxic action of calcium ions on the heart. This treatment should be supplemented by the injection of a similar amount of calcium borogluconate subcutaneously.

In recent years there has been a tendency towards the routine use of complex solutions of calcium, magnesium and phosphorus in the treatment of milk fever. Although there is usually no fall in the serum magnesium in true milk fever these solutions seem to give results comparable to those obtained from straight solutions of calcium borogluconate and perhaps only the therapeutic purist would object to their use. They are, however, more expensive than straight solutions of calcium borogluconate and their routine use would seem to be unnecessary. It is probably better to confine their use to cases which have relapsed and where hypomagnesaemia may be a complicating factor.

Cases of milk fever are encountered where, although the hypocalcaemia is apparently relieved by injection therapy, the cow remains recumbent. Such cases should be carefully examined for the presence of complicating conditions such as septic metritis and mastitis, fractured pelvis, obturator paralysis, etc., and appropriate supplementary treatment given. Where no apparent complications exist the author, in common with a large body of clinical opinion, believes that udder inflation is worth trying.

An important part of the treatment of the recumbent cow is proper attention to nursing; in these days of specific therapies this aspect is often neglected by stockmen. After injection treatment has been given the cow should be propped up, if necessary with bales, and it is important to ensure that she is lying on a good depth of straw to avoid the development of bed sores and to prevent injuries from slipping on concrete during attempts to get up. It is difficult to over-emphasise this aspect of treatment as many cows are lost unnecessarily through neglect of these simple precautions.

The treatment of atypical hypocalcaemia or "delayed milk fever" is on similar lines to those described above. It is even more important however to make a careful clinical examination in order to ascertain whether the hypocalcaemia is secondary to some other condition. The routine use of complex injections of calcium and magnesium in these cases is probably justified as they are more frequently complicated by hypomagnesaemia and it is not always possible to decide on clinical grounds alone the nature of the biochemical changes.

Prevention. The traditional method of prevention of milk fever has consisted of allowing the udder to remain fairly distended with milk for about 3 days following parturition and to avoid milking out the udder completely. This is quite a rational method but as many stock owners know it is by no means a certain method of prevention.

Recently two methods of prevention have been investigated. Firstly, Boda and Cole (1954) have shown that the feeding of a low-calcium, high-

phosphorus diet in the last month of gestation reduces the incidence of milk fever. They postulate that such a diet produces a compensatory hypertrophy of the parathyroids so that at parturition sufficient hormone is secreted to maintain a normal level of serum calcium despite the drain of commencing lactation. However, their method is contrary to widely accepted feeding practices and it is doubtful whether it is applicable in the field at present.

Secondly, Hibbs and Pounden (1956) have shown that the feeding of massive doses of vitamin D during the week preceding parturition results in a decrease in the incidence of milk fever. They found, however, that little protection could be expected unless vitamin D had been fed for at least 3 days and that protection could not be expected to last longer than 1 or 2 days after vitamin D feeding had stopped. The difficulty of accurately forecasting the exact date of calving coupled with the narrow limits of protection afforded by vitamin D feeding make the method difficult to apply, especially as there are very real dangers attendant on too-prolonged feeding of the vitamin.

It must be concluded, therefore, that at present there is no readily applicable method of preventing milk fever.

Hypomagnesaemia

This disease has been recognised as a separate entity only in the last three decades. There can be little doubt however that it occurred quite widely before then. But at the same time there seems to be strong circumstantial evidence that its incidence is increasing and there is good evidence that this increase in incidence is related to improved methods of grassland farming and in particular to the increased use of nitrogenous fertilisers.

The popular names for the conditions—" lactation tetany " and " grass tetany "—are both open to valid objection as the disorder is seen occasionally in non-lactating animals and is sometimes encountered in stall-fed cattle in the winter months.

In dairy cattle the disease is most commonly seen during the first few weeks after they have been turned out to rapidly growing pastures in the spring especially if the transition from a winter type of diet has been very sudden. However it can occur throughout the grazing season and, as has been mentioned, it may affect stall-fed cows in the winter months.

In beef cattle the condition is most frequently seen in out-wintered pregnant and lactating cows during the autumn, winter and early spring.

The disorder is also occasionally seen in calves—most commonly in beef calves about 3 to 4 months old which have been reared on an entirely milk diet.

While hypomagnesaemia is the salient and distinguishing biochemical feature, the condition is frequently accompanied by a hypocalcaemia. Thus Allcroft (1947) found that in 76 per cent. of 406 cases of hypomagnesaemia there was a concomitant hypocalcaemia.

A feature of the condition is that marked hypomagnesaemia may exist for considerable periods of time in individual animals and in groups of animals without the exhibition of any obvious clinical signs. Green (1948) suggested that there are 3 forms of hypomagnesaemia:—1. An acute type in which the fall in blood magnesium is very rapid (within a few days or hours) associated with an intense hyperaesthesia which may be followed by convulsive tetany and death. 2. A slowly developing seasonal hypomagnesaemia without clinical symptoms in which the blood magnesium falls slowly throughout the autumn and winter to one-third or one-half the normal summer value. The neuromuscular mechanisms apparently adjust themselves to the gradual change in plasma level and no hyperaesthesia develops. 3. An intermediate form in which the fall in blood magnesium is not so rapid as in the acute and not so gradual as in the seasonal type and the condition is one of " latent tetany " in which hyperaesthesia can be detected by clinical examination and in which an acute attack of convulsive tetany may be precipitated by a variety of causes such as a sudden cold spell, handling of the animal, oestrus, etc.

Aetiology. It is generally agreed that hypomagnesaemic tetany cannot be attributed to a deficiency of magnesium in the diet. Pastures on which the disorder occurs usually show a magnesium content as high and sometimes higher than those on which it does not occur. Various attempts have been made to correlate the occurrence of the condition with specific factors in the pasture—*e.g.*, high protein, high potassium, high nitrate and high manganese have at various times been suggested as causative factors but all have been eliminated by further research.

As has been mentioned, there is a great deal of field evidence correlating the incidence with the increased use of artificial fertilisers. Experimental evidence in support of this has been provided by Bartlett *et al.* (1954) who demonstrated an association between the occurrence of the condition and the heavy use of sulphate of ammonia in experimental plots. The precise factors which produce hypomagnesaemia in cattle grazing such pastures are, however, still unknown and we are still a long way from understanding the metabolic changes involved in the genesis of the disease.

Different factors must presumably be solved in the aetiology of the hypomagnesaemia seen in beef cattle in the winter months. Allcroft (W.M.) (1947) observed an association between low serum magnesium levels in a herd of out-wintered beef cattle and cold, wet, windy weather. Allcroft (R.) (1954) states that a high incidence of the disorder often occurs a few weeks after calving at a time when pasture growth is very low and the plane of nutrition is very poor and further observes that it is under these conditions that a sudden cold spell may precipitate clinical cases—that is at a time when the animal is subjected to heavy stresses—lactation, low plane of nutrition and high loss of body heat. The author would agree with these observations and would particularly emphasise the association between winter hypomagnesaemia and a low plane of nutrition as in all the outbreaks he has seen the plane of nutrition has been patently sub-optimal.

Hypomagnesaemia in suckling calves would

appear to have a more straightforward aetiology. Thus Blaxter and Sharman (1955), who found the condition to be widespread in suckled beef calves in the Inverness area, regard the condition as a simple dietary deficiency engendered by a high rate of growth in calves fed on an entirely milk diet which is not a sufficient source of magnesium.

Diagnosis. Advanced cases of hypomagnesaemia, where the animal is down showing the signs of convulsive tetany, present little difficulty in diagnosis. In less advanced cases the signs are those of increased nervous excitability—the animal appears apprehensive, the head is carried high, the eyes have a staring expression due to a widening of the palpebral fissures and dilatation of the pupils, the limbs are lifted in a stilted and exaggerated manner and there is an exaggerated response to superficial nerve reflexes. The temperature is often slightly elevated and may be markedly so in an animal which has been having severe convulsions for some time.

Generally speaking there is a correlation between the severity of the clinical signs and the extent of the depression in serum magnesium, but, as has already been stated, there may be marked hypomagnesaemia without the exhibition of obvious clinical signs. Conversely, cases are occasionally encountered in which typical clinical signs of hypomagnesaemia are exhibited and in which blood sampling shows no depression in serum magnesium or in serum calcium.

Quite frequently death occurs very rapidly and the animal may be found dead without clinical signs having been observed. This raises the problem of *post-mortem* diagnosis. Blood sampling even immediately after death is of no value as the blood magnesium level seems to rise very rapidly *post-mortem.*

Post-mortem examination of the carcase sometimes reveals very few lesions but frequently gross haemorrhages are seen particularly in the walls of the great vessels and the endocardium. Blaxter and Sharman (1955) have shown that in suckled calves which have died of hypomagnesaemia there is evidence of severe depletion of bone magnesium and they state that bone analysis can ascertain whether or not magnesium tetany was the cause of death. As is to be expected, the method is of no value in adult animals.

Treatment. The treatment of hypomagnesaemia is not so successful as that of milk fever and the mortality is still very much higher. Failures occur in 3 main ways. 1. The tetany may be controlled but the animal remains recumbent, refuses to eat and has eventually to be sent for slaughter. In such cases a severe fatty degeneration of the liver is a constant *post-mortem* feature. 2. In a proportion of cases which are in severe tetany at the time of treatment, it proves to be impossible to control the tetany and death occurs in a short time without its abolition. 3. Death may occur during treatment even although extreme care is taken in the administration of calcium and magnesium salts. The author has noticed that cases in the last two categories frequently show very dark, poorly oxygenated blood on venepuncture and he regards this as a poor prognostic sign and warns the owner accordingly.

The immediate treatment of hypomagnesaemic tetany consists of the parenteral injection of calcium and magnesium salts. The exact mode of therapy used in a particular case must depend on the severity of the clinical picture. In severe cases which are down and showing tetanic convulsions it is necessary to try to control the convulsions as quickly as possible. The author finds the following method to be satisfactory:—

About 200 c.c. of a standard proprietary complex solution of calcium and magnesium is given by slow intravenous injection, followed by the *very* slow intravenous injection of about 100 c.c. of a 25 per cent. solution of magnesium sulphate. The injection of the magnesium sulphate solution should occupy 10 to 15 minutes, and must on no account be given more rapidly because of the risk of death from the toxic action of magnesium ions on the heart. Some clinicians are entirely opposed to the intravenous use of magnesium sulphate but the author believes that it is essential in some cases in order to control the tetany, and that it is a perfectly safe procedure if it is done sufficiently carefully. Intravenous treatment is then supplemented by the subcutaneous injection of a further 200 c.c. of the complex calcium and magnesium solution and 300 c.c. of the 25 per cent. solution of magnesium sulphate. In less severe cases, which are not in convulsive tetany at the time, treatment is on the same lines except that it is not necessary to give any magnesium sulphate by intravenous injection.

In some severe cases where the above therapy fails to control the tetany, beneficial results are obtained by the intravenous injection of half to one ounce of chloral hydrate.

Injection therapy should always be supplemented by the oral administration of magnesium. Calcined magnesite is a cheap and suitable form, given at the rate of 2 ounces per day. It should be given by drench as it is somewhat unpalatable and it usually takes some days before animals can be persuaded to eat it in concentrates. In cases which relapse the dosage rate may be doubled. The oral dosing should be continued for at least a week or until the danger period is considered to be over. It can then be gradually withdrawn—it is important that it is not suddenly stopped as this may result in a fall in serum magnesium and the recurrence of clinical signs.

Cases of hypomagnesaemia tetany should be handled as quietly as possible since rough handling may precipitate a severe convulsive attack.

Prevention. It has been shown in recent years that although hypomagnesaemia tetany cannot, in most cases, be attributed to a deficiency of magnesium in the diet, it can be largely prevented by oral dosing with magnesium salts during susceptible periods for particular herds. Allcroft (1954) recommends the use of about 2 ounces per head per day of calcined magnesite.

There are practical difficulties in the application of this method in the control of the spring type of hypomagnesaemia. The main difficulty lies in the unpalatability of calcined magnesite—many cows will not eat it unless it is heavily diluted in a concentrate

(*Concluded at foot of page overleaf*)

Ringworm in Cattle

Prevention and Treatment with Griseofulvin

BY

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SUMMARY.—Daily administration of griseofulvin per os *for 5 weeks from the day of inoculation with* Trichophyton verrucosum *prevented the establishment of artificial infection of 4 calves.*

Five weeks after inoculation 3 other calves which had received no griseofulvin had developed mature ringworm lesions. Two of these were then given griseofulvin orally for 3 weeks and the remaining one left untreated. The latter continued to have lesions for more than 3 months while the 2 treated animals showed no fungi histologically after 2 weeks, and at the end of 3 weeks new hair was growing strongly and the typical ringworm crusts were no longer present.

Introduction

ALTHOUGH bovine ringworm is widespread in Great Britain (Ainsworth & Austwick, 1955) and has been shown to be an important reservoir for ringworm in man (Gentles & O'Sullivan, 1957) no substance applied topically, or otherwise administered, has proved to be really effective under controlled conditions. It is therefore not proposed to review the literature on treatment.

Following the successful treatment of *M. canis* ringworm in guinea-pigs by oral administration of griseofulvin (Gentles, 1958), it was decided to test this substance in calves exposed to artificial infection with *T. verrucosum*.

Materials and Method

Griseofulvin is a metabolic product of a number of species of *Penicillium*, first isolated by Oxford Raistrick and Simonart (1939) and also isolated as "curling factor" by Brian, Curtis and Hemming (1946). It was called "curling factor" because its fungistatic action was associated with malformation of the tips of growing hyphae. Griseofulvin is sparingly soluble in water and in the following experiments it was administered by drenching each animal daily with a saccharine suspension. The daily dosage rate was approximately 60 mg. per kg., which was known to be effective against *M. canis* ringworm in guinea-pigs (Gentles, 1958).

Seven two-month-old Friesian bull calves were bought in the open market. They were then free of skin lesions and for the duration of the experiments were kept untethered in a loose-box, the walls of which were faced with concrete. The animals were

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Refresher Article No. 13—*Concluded.*

ration. Therefore only cows giving high yields and receiving fair amounts of concentrates will get sufficient magnesium. Such cows are, however, most susceptible to the disease. Other methods are to feed proprietary "grazing nuts" supplemented with magnesium or to incorporate in the ration proprietary mineral mixtures reinforced with magnesium. Whichever method is used the magnesium supplementation should start at least a fortnight before the cows are turned out and should continue until the danger period is considered to be over—on most farms this will be about the end of June.

Additional precautions which should be taken include the avoidance of a too-sudden transition from a winter type of diet to the grazing of rapidly growing pastures. The continued feeding of hay is a valuable precaution during the danger period, and where possible the grazing of lush rapidly growing leys should be alternated with the grazing of older, coarser pastures.

The prevention of hypomagnesaemia in beef cattle in the winter months is in some respects less difficult as it is usually easier to get the animals to take a magnesium supplement, probably because their general plane of nutrition is often low. They will usually take calcined magnesite if it is mixed with chopped roots, sugar beet pulp, or brewers' grains. Occasionally beef cattle will readily consume a straight magnesium-rich mineral mixture put out in covered troughs in the field. As this type of hypomagnesaemia is, however, nearly always associated with a low general plane of nutrition, it is wise to supplement the diet with hay, silage or roots.

Blaxter and Sharman (1955) have shown that hypomagnesaemic tetany in beef calves can be controlled by the oral administration of 500 mg. of magnesium carbonate per head per day.

There is some evidence to show that hypomagnesaemic tetany can be controlled under certain circumstances by the application of magnesium-rich artificial fertilisers, but this aspect of the subject requires further study before definite recommendations can be made.

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bedded in straw which was renewed daily and they were fed on proprietary calf cake and hay. On the 7 calves two areas, one on either side of the spine at the middle of the back, and each approximately 9 inches long by 2 inches wide, were clipped very closely with scissors. On the right side, scabs scraped from calves in an early stage of natural ringworm infection, were moistened with normal saline solution and vigorously rubbed in with the rubber-protected finger after the method of Sellers, Sinclair and La Touche, 1956. *T. verrucosum* had previously been isolated from the field material, which was also seen microscopically to be rich in arthrospores and hyphae. On the left side of the back a young agar culture of *T. verrucosum* was similarly applied. The areas which became infected when inoculated with the culture, developed lesions more slowly and less severely than those inoculated with naturally infected material. The clinical observations on experimental lesions described below are confined to those produced by the field material on the right side of the calves. Inspection and palpation of the inoculated area and the rest of the body surface were recorded weekly for 8 weeks and at longer intervals thereafter. Skin biopsies were taken from the right side on the day of inoculation, at weekly intervals for 8 weeks and also during the tenth and thirteenth weeks. The material was fixed in picro-formol and the sections stained by the periodic-acid Schiff method. Sections from each biopsy were examined to establish if infection was present and, if so, a number of follicles, in some cases up to 300, was counted and the percentage of infected follicles determined. On numerous occasions in the course of the experiments *T. verrucosum* was grown from the lesions.

Protection Experiment

Starting on the day of inoculation, calves Nos. 4, 5, 6 and 7 received griseofulvin daily, while calves Nos. 1, 2 and 3 received only the unmedicated vehicle (see Table). At the end of one week, histological examination revealed that very light infection was present in 2 of the 3 untreated animals and at the end of a fortnight there was definite infection in all 3 calves (Fig. 1) and this tended to increase during the next 3 weeks (Fig. 2). All 3 had palpably thickened skin at the end of 3 weeks, slight loss of hair and slight grey crust formation at the end of 4 weeks and marked bareness and crust formation at the end of 5 weeks (Fig. 4). During this time the 4 calves which had received griseofulvin did not develop either histological or clinical evidence of infection (Fig. 5). At the end of the five-week period griseofulvin was stopped in calves 6 and 7 but continued for a further 3 weeks in calves 4 and 5. None of these 4 animals developed lesions on or near the inoculation area, but 2 to 3 months later calves 4, 5 and 6 developed a few small non-progressive lesions elsewhere.

Treatment Experiment

Since the 3 unprotected calves had developed gross lesions on their backs, these animals were used for a small treatment trial. Calf No. 1 was left as an untreated control, and for 3 weeks 2 and 3 were given griseofulvin as in the previous experiment. At the end of the first week histological examination of the skin of the treated calves showed a very marked reduction in the number of infected follicles (Fig. 3), although the clinical picture was then little changed. At the end of the second week the 2 treated animals had no histological evidence of infection and large patches of overlying crust had disappeared. At the end of the third week there were no crusts and new hair was growing strongly (Fig. 6). The lesions of the untreated calf were still gross clinically (Fig. 7) and heavily infected microscopically. Twelve weeks after this time the treated animals were still clear, although bearing unpigmented "scar" hair, while the untreated animal had still a few patches of crust present. No side-effects were observed.

Discussion

Histological evidence of the phase of infection occurred about a fortnight before the clinical signs. Thus, definite infection could be present in the skin, although the latter seemed clinically normal, and, conversely, when histological evidence of skin infection had disappeared, overlying infected crust might still be present.

Although at one time during the experiments 3 calves had heavy infection and all 7 were in close contact, and promiscuous licking of each other's lesions took place, only a few secondary lesions developed. They did not appear at any time on calves 2 and 3, possibly because of the development of immunity as a result of the presence of the highly inflammatory reaction (Sellers *et al.*, 1956). The immunity was not challenged by experimental inoculation but a natural challenge existed from the contact with calf No. 1.

Three out of 4 animals which never had experimental lesions later developed ringworm on areas remote from the original inoculation site. These small, non-progressive lesions healed quickly, perhaps as a result of the presence of a small amount of residual griseofulvin in the skin. That they occurred at all shows that the prophylactic action of griseofulvin was temporary.

In the light of our present knowledge, treatment of already established infections would seem to be a more useful application of the drug. These preliminary results, although based on very small numbers, indicate a new approach to the control of ringworm in calves. Much more information is required and further work is proceeding. Meanwhile the use of griseofulvin in bovine ringworm should be regarded as being of an experimental nature.

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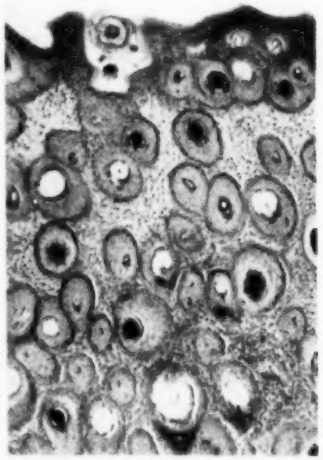

FIG. 2

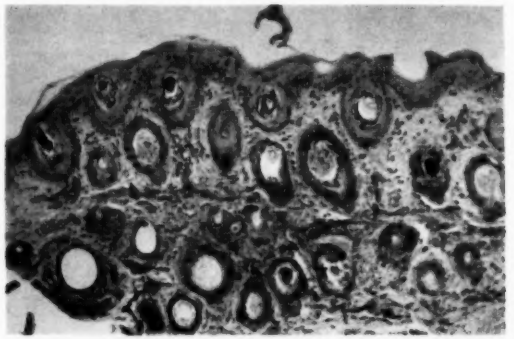

FIG. 1

FIG. 4

FIG. 1.—Infection of hair follicles two weeks after inoculation. Stained P.A.S. × 62.

FIG. 2.—Heavy infection of hair follicles five weeks after inoculation. Treatment started at this time. Stained P.A.S. × 62.

FIG. 3.—Reduced infection at the end of one week's treatment. Stained P.A.S. × 62.

FIG. 5

FIG. 4.—The back five weeks after inoculation; no griseofulvin given.

FIG. 5.—The back five weeks after inoculation; griseofulvin given.

FIG. 6.—The back three weeks after the start of treatment.

FIG. 7.—Back of untreated calf after similar period.

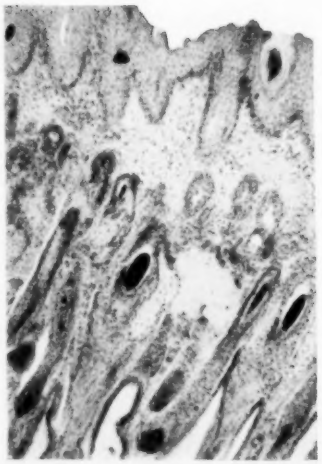

FIG. 3

FIG. 6

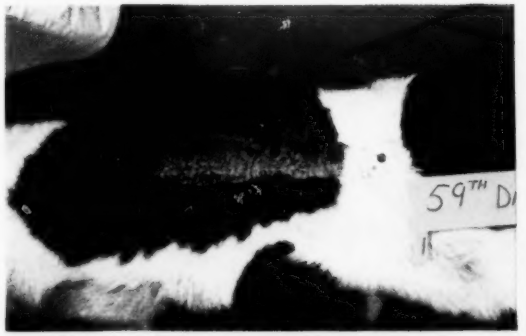

FIG. 7

Ringworm in Cattle: Prevention and Treatment with Griseofulvin

TABLE
ADMINISTRATION OF GRISEOFULVIN IN CALF RINGWORM

Calf Number	Degree of infection	Weeks after inoculation with *T. verrucosum*									
		1	2	3	4	5	6	7	8	9	10
1	Clinical+	–	–	+	+++	++ ++	++ ++	++ ++	+ +++ +		+ +++ +
	Microscopic*	1	63	79	51	79	93	37	46		72
2	Clinical	–	–	+	+++	+++	++	+	–		–
	Microscopic	1	32	48	55	60	5	–	–		–
3	Clinical	–	–	+	+++	++ ++	++ ++	++	–		–
	Microscopic	–	56	64	100	38	10	–	–		–
4	Clinical	–	–	–	–	–	–	–	–		–
	Microscopic	–	–	–	–	–	–	–	–		–
5	Clinical	–	–	–	–	–	–	–	–		–
	Microscopic	–	–	–	–	–	–	–	–		–
6	Clinical	–	–	–	–	–	–	–	–		–
	Microscopic	–	–	–	–	–	–	–	–		–
7	Clinical	–	–	–	–	–	–	–	–		–
	Microscopic	–	–	–	–	–	–	–	–		–

Calf Number	Degree of infection	Weeks after inoculation with *T. verrucosum*									
		11	12	13	14	15	16	17	18	19	20
1	Clinical+			+ +++			++ ++		++		+
	Microscopic*			+ 40							
2	Clinical			–			–		–		–
	Microscopic			–							
3	Clinical			–			–		–		–
	Microscopic										
4	Clinical			–			Ear +		+		–
	Microscopic										
5	Clinical			–			Chest +		+		–
	Microscopic										
6	Clinical			–			–		–		Nose +
	Microscopic										
7	Clinical			–			–		–		–
	Microscopic										

+ Based somewhat arbitrarily on size of lesion, thickness and bareness of skin and crust formation.
* Percentage of follicles infected.
——Period of administration of griseofulvin.

Observations on Some Aspects of Obstetrics in the Ewe*

BY

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SUMMARY.—The writer's method of lambing ewes, developed as a result of observations and practice during a ten-year period, is described. This includes a system of examination, positioning, correction of malpresentations, and after-treatment.

Observations are made on twin lambings, putrefying foetuses, embryotomy, rupture of the uterus, and caesarean section.

Normal lambing, vaginal prolapse, and prolapse and inversion of the uterus are discussed in the light of observations made and information gained from the literature available.

Introduction

THIS thesis is an attempt to record and elucidate certain types of complications, abnormalities, and sequelae met with in obstetrics in the ewe; together with some procedures and methods of correction and treatment that have proved useful in the writer's practice, as well as some that are recommended in the literature. The record covers observations made, and practice, during the period January, 1947, to May, 1956. The cases obtained were from various flocks of Welsh mountain sheep in Caernarvonshire and Merionethshire, most of them mated by a Welsh ram and some of them mated by Suffolk, Wiltshire, or South Down rams. An account is given of normal and abnormal states observed, of data collected, and of some inferences drawn.

Lambing the Ewe

During the first 3½ months of each year approximately 120 ewes were lambed, a total of some 1,200 sheep for the period. Almost all of these cases were dealt with in the surgery, the farmers soon having become accustomed to conveying them there and taking them back directly, or as soon as possible, after they had been delivered of their lambs.

With his first cases the writer found that lambing the ewe could prove distressingly difficult, besides being time-consuming, but with experience the following procedures and methods were developed and satisfactory results obtained.

Procedure for Lambing Cases Developed as a Result of Lambing Experience and Observations Made During the Period

On receiving a ewe in lambing difficulties the case is first evaluated visually. The general external condition and state of the sheep is appreciated and the operator looks particularly for evidence of attempted delivery by the owner or shepherd. Many cases were observed during the period which had received a moderate amount of pre-admittance vaginal interference which was recognised by oedema and reddening or bruising of the vulval labiae; whilst 13 cases were admitted with rupture of the neck of the uterus which was recognised initially, or at least suspected, by vaginal bleeding. (These 13 ewes were in distress with haemorrhage and shock, and their slaughter forthwith was advised.)

Having satisfied himself on the point of interference, the operator then considers any evidence regarding time. A clean vulva with nothing showing but a fresh, normal discharge of allantoic and/or amniotic fluid indicates an early case. A foetid brownish-yellow discharge indicates a delayed case with some degree of putrefaction of the foetus. If foetal parts are exposed, their state of dryness is noted in assessing the duration of labour.

Having made this preliminary study, the operator proceeds with the following routine in all cases.

The front legs of the ewe are tied together with thick bandage around the fetlocks, and then the shepherd or assistant is asked to hold up the sheep by its hind legs, one in each hand, with its back away from him and its shoulders resting on the floor. This position, henceforth called the suspended position, greatly facilitates entrance by hand into, and manipulation in, the vaginal passage and uterus as the womb and contents drop away from the pelvis.

Moreover the ewe in this position does not render examination and correction as difficult, as straining is less severe and there is consequently less impaction in the vagina. There is also less danger of tearing the genital tract while pushing the foetus, or parts of it, back into the uterus. This retropulsion was found to be very necessary with some difficult presentations, such as flexion of both fore legs and engaged breech, to provide room for the hand to manipulate safely, and, as Wright (1950) states, "the facility with which malpresentation can be corrected (in the ewe) will depend in a large measure on the operator's ability to pass his hand through the pelvis into the uterus."

Belschner (1950) advises placing the ewe on its feet, if possible, for ascertaining the nature of the presentation, but adds that in most cases it must be made with the ewe lying on its side as it is unable to stand. He also states that "it may be necessary to raise the ewe's hind quarters so that the foetus can be pushed far enough back to turn it." Before vaginal examination is proceeded with, the wool around the perineum is clipped and the area washed and, if dirty, disinfected. Wearing a parturition overall and with hands and arms well soaped the operator opens the vulva with the fingers and, if preadmittance attempted delivery is known or suspected, he examines visually the vaginal passage and cervix region carefully for possible iniury. Having satisfied himself on this point, and having found no suspicion

* Extract from Thesis presented for Fellowship of the Royal College of Veterinary Surgeons.

of rupture of the genital tract, the operator pours into the vagina thin liquid paraffin until it is full. If it is a case where foetal limbs or head are in the vaginal passage, as much oil as possible is poured around them. The case is now ready for exploration of exact presentation.

In all but the occasional small young ewe, after the preparation and in the position described, it is possible to weave the average size hand right into the vagina and often into the womb. After gaining entrance to the vagina, the operator palpates the cervical region of the genital tract and considers whether or not dilatation is complete and sufficient to allow delivery of the lamb. In some cases dilatation may be just sufficient to allow delivery of a lamb normally presented, but not sufficient to allow correction of malpresentation before delivery. In these cases the cervix can be felt like a ring around the hand and the operator considers whether the risk of tearing the neck of the uterus would be so great during manipulation as to warrant either giving the ewe more time or resorting to the operation of caesarean section. This insufficient dilatation of the cervix occurred in 15 per cent. of the lambing cases dealt with during the period. The 15 per cent. was further divided into 3 per cent. cases where the cervix only allowed the entrance of a finger, 3 per cent. cases where 3 fingers could be inserted, and 9 per cent. where dilatation was 80 per cent. complete allowing all the fingers but not the hand.

In these cases, if labour was already protracted, caesarean operation was proceeded with forthwith, but if the case was early with foetal membranes intact or just ruptured, the ewe was set free into a paddock and examined again, if it had not lambed on its own, in 2 to 3 hours. If then there was no progress at all shown, treatment was attempted on some cases. If dilatation of the cervix was progressing, the sheep was left in the paddock and examined at intervals. If at a maximum of 24 hours after admittance cervical dilatation was still insufficient to allow delivery, caesarean operation was carried out.

During the last 5 years of the period 15 cases with undilated cervix allowing only 3 finger tips (an average of 3 cases each year) were treated with the following: 25 c.c. of 40 per cent. calcium borogluconate and 1 c.c. stilboestrol dipropionate (10 mg. per c.c.) by injection. Five of these ewes lambed themselves of a live lamb within 6 hours of treatment, whilst another 5 ewes had dilated sufficiently by the following day (approximately fifteen hours) to be delivered of a lamb (2 live lambs, 3 dead lambs). On the other 5 ewes caesarean operation was performed, as the cervix did not dilate sufficiently within 24 hours of admittance and treatment. From these operation cases 1 live and 4 dead lambs were recovered.

The calcium borogluconate was used empirically, and it was realised from experience of its use in cattle that the effect of the stilboestrol might take up to 24 hours or more to be apparent. No controls were used and as the condition tends to resolve itself it is difficult to assess the value, if any, of the treatment described.

It seems now that a more logical line of treatment may be in sight for undilated cervix. A water-soluble hormone (believed to be a polypeptide) called relaxin and found in the serum of several pregnant animals has the effect of softening the cervix uteri and relaxing uterine muscle (*The Lancet*, 1956). It cites Zarrow *et al.* who studied cervical relaxation following the administration of stilboestrol and relaxin to castrated sows. "They found that after relaxin a cervix previously resistant could easily be dilated."

Having ascertained that the vagina and cervix of a ewe allowed manipulation and delivery of the lamb, the methods described below were used for this purpose. Some of these methods of correction, whilst basically resembling obstetrical techniques applied to the cow, were developed and designed to suit the ewe as a result of experience gained with lambing cases during the period under review.

Presentations and Malpresentations Encountered and their Correction

Anterior Presentation

This was the presentation in 65 per cent. of the lambing cases dealt with during the period.

Malpresentations:—

1. *Flexion of the Head to the Lateral Posture*

This was the commonest fault, being present in half the cases in difficulty with anterior presentation; the two front feet being presented at the vulva or in the vagina and the head flexed to the right or to the left with the nose well below the level of the pelvic brim.

Method of correction. Position of ewe: suspended. The front feet of the foetus are secured with good white clean sterile string looped above the hooves. They are then gently pushed back into the uterus sufficiently to allow the hand to manipulate the head. With the second finger under the jaw the nose is grasped with first finger and thumb and led over the pelvic brim and, as soon as that is accomplished, the head is grasped by the eye sockets, again with the first finger and thumb. With the operator retaining this hold, the assistant holding the ewe is then asked to lower it carefully on its side and the head of the foetus is then pulled squarely into the vagina.

Lowering the ewe on its side immediately after repositioning the head and before applying traction to it was found to be a great help, as one was not working against gravity and the ewe was more likely to help by straining. It was found important that the head should be presented dorso-ventrally into the vagina, otherwise the neck of the womb was easily injured or even torn. For the same reason it was found inadvisable to grasp the head with the hand round the skull.

The head is pulled until the nose is presented at the vulva. The front feet are then pulled through the vagina one at a time by gentle, firm traction on the string applied to them. Once the fetlocks are out of the vulva the head is again grasped by the grip described on the eye sockets and pulled out of the vulva. Traction is then applied to the two front legs as well as to the head and the lamb delivered.

2. *Flexion of One Fore Leg*

This was encountered in approximately 15 per cent. of the cases in difficulty with anterior presentation. The incidence in the field is probably higher, but some ewes with this presentation are delivered without correction by the shepherd. The ones brought to the writer were usually medium or small ewes with large lambs. The leg was flexed either at the knee or at the shoulder; in most cases it was flexed at the shoulder having probably developed into that position during labour, from flexion at the knee. Where there had been an attempt at delivery by the shepherd by traction on the correctly presented other fore leg or head, the malpresentation was aggravated of course. The position of the correct fore leg and head therefore varied; in the early case, not interfered with, they were found at the anterior vagina, whilst in the late case, and where there had been an attempt at delivery, they were found at the vulva or out of it.

Method of Correction

(a) *Early case.* Position of ewe: suspended.

After preparation, the hand is gently eased into the vagina and the presented foot secured with string. Then, with the fingers and thumb over the pelvic brim, the uterus is explored until the flexed foot is found. Grasping this with either first or second finger and thumb, it is brought up into the vagina with a slightly abducted rotation and secured with string. Once this is accomplished, the position of the head is again examined, as it may have receded from the cervix and also deviated during the correction of the fore leg. Once the head is seen to be safely through the cervix the lamb is delivered as in normal presentation.

(b) *Late case.* Position of ewe: to begin with, on side with presented leg lowermost.

Here one leg and the head is usually found at the vulva. The first thing considered is, especially if the lamb is alive, whether or not delivery is possible and advisable in this position without correction. This is ascertained by gently inserting the extended fingers into the vagina on the side of the "missing" leg and finding the point of the shoulder. If this is through the cervix region delivery without correction is sometimes possible by traction on the presented fore leg with one hand and lateral pressure on the point of the flexed shoulder with the fingers of the other hand. Alternatively, the flexed fore leg is drawn into correct position by traction with the fingers, first behind the shoulder and then behind the knee as that comes within reach. If the point of the flexed shoulder is not through the cervix, and little or no room is found there on exploration, the flexion is corrected in the uterus. With the ewe in the suspended position, presented parts of the lamb are well oiled and gently pushed back into the womb. Sometimes where the lamb is big and drying, it is advisable to loop string to the presented fetlocks and head before replacement. After pushing the presented parts as far as the cervix the case is dealt with as described above for (a). Where the head is actually at the vulva, and the lamb is dead and correction of the flexed fore leg is desirable, it is advisable and customary to perform decapitation by cutting the head at the first joint of the neck. The foetus is then pushed back as far as necessary into the womb with less hazard to the ewe.

3. *Flexion of Both Fore Legs*

This was encountered in approximately 15 per cent. of cases in difficulty with anterior presentation. In some the muzzle only was showing, whilst in others the head was out to the level of the eyes or ears.

Method of correction. When the lamb is alive, the head is secured with tape and, with the ewe in the suspended position, it is well oiled and pushed back into the uterus so that there is sufficient room to find the feet and secure them with string. The case is then dealt with as in presentation 2 (a). If the lamb is dead, and the head well out of the vagina, decapitation is performed with the ewe on its side. Then, with the sheep in the suspended position, oil is poured into the vagina and the foetus pushed back with a hold on the broken neck with fingers and thumb until the fingers can be inserted over the pelvic brim. The front feet are found and brought into the vagina, the ewe lowered on its side, and traction applied to both fore legs with one hand, whilst the fingers of the other hand guide the stump of the neck through the vagina.

4. *Flexion of One Fore Leg and Head*

This is a combination of presentations 1 and 2 and was encountered only in 2 per cent. of the cases in difficulty with anterior presentation. The presented foot was usually in the vagina, with the other fore leg flexed at the shoulder and the head, and sometimes neck as well, flexed to the right or to the left.

Method of correction. Position of ewe: suspended. With the vagina well oiled, the hand is gently inserted, whilst the presented foot is held with the other hand. The position of the flexed fore leg is examined and this is corrected as described. In order to facilitate this, it may be necessary to let the foetus drop a little into the uterus by easing the hold on the presented fore leg or, in a tight case, pushing it back a little. Once the two front fetlocks are in the vagina, string is applied to them and the head and neck corrected (see below). Before this correction is possible, it may be necessary to push both the front feet back over the pelvic brim into the uterus in order to obtain sufficient room.

5. *Flexion of Head and Neck to Lateral Posture*

This is an aggravation of the flexion of head presentation and occurred in 18 per cent. of anterior presentation cases dealt with. Expulsive efforts on the part of the ewe, or traction on presented fore legs by an inexperienced shepherd, had brought the shoulder regions of the foetus to the neck of the uterus with the head and neck flexed right back. This presentation always had to be treated carefully and with patience as there was considerable risk of tearing of the womb. Most of the cases were in varying stages of dryness, uterine fluids having been

lost and the uterine walls clinging closely to the foetus leaving little room to do the correction.

Method of correction. Position of ewe: suspended. Oil is used liberally and the fore legs taped and replaced over the pelvic brim. The hand is inserted flat along the dorsal aspect of the flexed neck until the second finger can be inserted in the outward eye socket. The thumb is placed under the outward jaw bone and the head rotated first ventrally, and then laterally, to save pressure on the uterus. As the head is drawn towards the pelvis, the flexion of the neck corrects itself. Once the head has entered the pelvis, the fore legs are drawn, by means of string attached to them, through the vagina simultaneously with the head.

Posterior Presentation

This presentation was met with in 27 per cent. of the lambing cases dealt with.

Malpresentations. 19 per cent. of the cases were hip flexion postures (breech presentations) whilst 8 per cent. were hock flexion postures.

1. *Hock Flexion Posture*

In all cases dealt with this was bilateral and the foetus not engaged in the pelvis. The ewes with this malpresentation were ones brought in reasonably early before prolonged straining and loss of fluid had occurred.

Method of correction. Position of ewe: suspended. The vagina is filled with oil and the hand is inserted far enough into the uterus for one hock to be grasped in the palm of the hand. With the thumb over the posterior aspect of the *os calcis* bone and the fingers round the anterior aspect of the hock, the leg is rotated backwards and upwards until the foot can be brought either into the vagina (in a large ewe) or just anterior and below the level of the pelvic brim. In the latter case the hold is released at the hock and the fingers moved down the metatarsus to the fetlock without letting the leg rotate forward to the original position. Once the fetlock is grasped the hold is moved to first finger and thumb on the digits and the foot drawn into the vagina for a distance of approximately 2 inches past the pelvic brim. The other leg is then felt for and dealt with similarly. Once the two legs are in the vagina, the sheep is lowered on its side and traction is applied to them. The writer did not find it necessary or desirable to apply traction to one hind leg and then the other as sometimes in the bovine animal. Traction could often be applied sufficiently with one hand grasping the two feet, whilst the other hand directed the base of the tail out carefully. Once this had been negotiated with a large lamb, the hind legs sometimes had to be taken one in each hand for the necessary traction to negotiate the body through the pelvis.

2. *Breech Presentation (Hip Flexion Posture)*

With this presentation the first thing considered was whether or not it could and should be reduced to a disengaged hock flexion presentation and delivery effected as described for that presentation, or whether delivery should be by caesarean section or embryotomy. The main factors that decided this were the duration of labour and its effect on the state of dryness and contraction of the genital tract, the extent of the engagement of the perineum of the foetus in the pelvis of the ewe, and the size of the lamb in relation to the size of the ewe.

Method of correction. In the great majority of the cases dealt with, it was found possible to carry out the reduction referred to above, provided the ewe was held in the suspended position and plenty of oil used in the manipulation. An average of 2 cases a year were not reduced and operated on by caesarean section.

When the foetus is engaged in the pelvis of the ewe the base of its tail is gently and firmly pushed until it is disengaged and back in the womb. Using the right hand the operator passes the first finger and thumb down the lamb's right hind leg, unless the left is more accessible, until the hock can be held fingers at the front, thumb at the back, below the point, and then flexed towards the maternal pelvis using the side of the hand to keep the perineum of the foetus as high as possible in the uterus. The other hock is then felt for, but often approaching it from the internal aspect, that is with the fingers and thumb going between the foetus's hind legs. This hock is similarly flexed using the hand again in a double action. Once the presentation is a hock flexion it is dealt with as described.

Dorso-transverse Presentation (Dorsal)

This was present in 8 per cent. of the cases dealt with and it always proved to be an awkward presentation. Examination reveals only the wool of the back or rump and the lamb presented transversely in the womb.

In each case the exact position of the lamb was ascertained by digital palpation *per vaginam* using plenty of oil with the ewe in the suspended position, and sometimes by palpation from the outside through the ewe's abdominal wall. Having done this it was decided whether or not the case was deliverable without caesarean operation and whether the lamb was to be turned into an anterior or posterior presentation. If there was a choice it was preferred to make it a posterior presentation, of course, so as not to involve the head. It was found that a transverse presentation tended to be more posterior than anterior and correction thus most often involved gradual rotation of the foetus until the presentation was a breech.

Method of correction. Position of ewe: suspended. The vagina is filled with oil and room made with the fingers for it to percolate as far as possible around the foetus. By grasping its wool and skin the foetus is then slowly pulled round in the womb pushing it forward as little as possible so as not to put strain on the uterine wall. The base of the tail when it comes within reach is used as anchorage to complete the process of rotation. Once the presentation is a breech it is dealt with as described.

Twins

No special difficulty was experienced on account of twins. One twin always followed the other without parts of both being actually presented simultaneously. In 80 per cent. of the cases of twins the first lamb was presented anteriorly with flexion of the head or flexion of the head and neck whilst the second twin was presented correctly in the womb.

In 20 per cent. of the cases the first lamb was presented posteriorly with hock flexion or breech presentation and the second twin presented correctly with anterior presentation.

After the birth of the first twin the second one was found during exploration and its delivery helped by gentle traction in the usual manner.

Wright (1950) states that "the incidence of twinning and even triplets is high in those ewes which have been done well previous to mating time" and "multiparity is often associated with the simultaneous presentation of parts of more than one foetus." He states, however, "that the young in cases of twins and triplets are small and retropulsion and reposition is seldom difficult." This fact, which favours delivery by the owner or shepherd, and the relatively small size of the Welsh ewe compared with some breeds, possibly explains why no case with actual simultaneous presentation of parts of more than one foetus was brought to the writer.

Putrefying Foetuses

Twenty-eight cases, an average of approximately 3 ewes a year, were dealt with in which the lamb had been dead for some days, labour in the ewes having been missed by the shepherd until they were seen to be straining frequently, sometimes with a humped posture and sometimes having a full udder and occasionally attempting to foster newly born lambs. The foetuses were in varying stages of early putrefaction with emphysema. The presentation in 16 cases was breech and in 12 cases dorso-transverse (dorsal). In 9 of the breech cases and 10 of the dorso-transverse cases contraction of the uterus and vagina from maximum dilatation was such that caesarean section was performed without attempting delivery *per vaginam*. In the others delivery was effected as described for those presentations.

Three cases were dealt with during the 10-year period in which dead lambs had been retained for several weeks in the uterus and had eventually by putrefaction been reduced in mass sufficient to be partly passed into the vagina. The presence of the foetus then became apparent by straining on the part of the ewe and a foul smelling discharge from the vagina. Delivery was effected in these cases by using a Hobday type of obstetrical forceps and fixing it on the nearest part of the foetus without attempting much manipulation and correction. The foetuses were thus removed piecemeal and the vagina then flushed with warm saline solution. The ewes were given the full after-delivery treatment described. All 3 cases recovered but no attempt was made to breed from them again.

Embryotomy

It was not found necessary or advisable to resort to embryotomy in the lambing cases dealt with apart from decapitation of some dead lambs with flexion of both fore legs and removal piecemeal of putrid foetuses as described.

Belschner (1950) says that in removing a swollen dead lamb "it may be necessary to cut a portion of the lamb away and remove it in sections . . . the open blade of a small, clean, sharp knife is guarded by the fingers and taken into the uterus. An attempt is now made to cut off the fore legs at the shoulders including the shoulder blades . . . with the fore legs removed the head may be seized and the dead lamb drawn out, the legs being removed later." Wright (1950) says that "in cases of lateral deviation of the head and breech presentations in which manipulative reposition fails, embryotomy using the guarded wire saw is indicated."

Rupture of the Uterus

During the first 4 years of the period, the uterus was accidentally ruptured during obstetrical manipulation in 4 ewes. The presentation in each of these cases was anterior with extreme flexion of the head and neck and the uterus clinging closely to the foetus. The tear occurred in the lateral aspect of the uterus just forward to the bony pelvic arch and where tension during repositioning would be expected. All the sheep immediately showed evidence of haemorrhage and shock by increased respiration with grinding of the teeth and blood in the vagina. The lambs were alive in 2 of the cases and were delivered but the mothers took no notice of them.

In one case an effort was made to repair the damage by laparotomy but the sheep died that night. There was the added complication of uterine fluids and oil having leaked into the peritoneal cavity. On economical and humane grounds the other 3 cases were slaughtered as soon as the damage was recognised.

System Developed of After-delivery Examination and Treatment

Immediately after a delivery, while the operator washes his hands, the lamb whether alive or dead is put by the head of the sheep and note taken of the ewe's interest in it and general behaviour. Ewes observed suffering from exhaustion and shock as a result of protracted delivery or trauma of the genital tract lay down breathing rapidly and grinding their teeth but they soon licked their lambs.

The operator in all cases proceeds by cleaning the vulva and perineum of the ewe and then with the sheep in the suspended position once more he examines the vagina and neck of the womb for possible injury and the uterus for the presence of a twin.

In fresh cases the foetal membranes are left to be expelled naturally, but after delivery of dead lambs a little traction is applied to them to test their ripeness for removal manually. If they yield very readily they are removed by gentle, steady trac-

tion. As a routine in all cases where a fresh lamb has been delivered a little sulphanilamide is powdered into the vaginal passage. In those cases where the lamb is delivered dead, and especially where it has started to putrefy, a pessary of streptomycin and penicillin is inserted into the uterus and sulphanilamide powder dusted as far as possible into the genital tract, as there is always a possibility of a pessary being voided before it has dispersed.

In these cases where there is infection or bruises which may become infected, depending on the severity of the case, half to one million units of sodium or procaine penicillin suspension is given by injection and sulphadimidine 5 g. once daily by mouth for four to five days. Sometimes the owner is advised to bring the sheep back once or twice during that time for more penicillin by injection and also advised to nurse the animal, keeping it indoors at night and bottle feeding it if there is inappetence.

No prophylactic injections of blackleg antiserum were used during the period.

The newly born lamb does not usually need any attention save to be placed in a clean receptacle pending transfer to its home ground and be allowed to be licked and dressed by its mother. However, if the ewe should be too exhausted (which is unusual) to be able to do this straight after being released then the lamb is dried manually and the umbilicus if long cut and dressed.

Where there has been a protracted lambing and the newly born animal is weak its nostrils are cleaned and, where necessary, artificial respiration applied for some minutes by rhythmically pulling the two front legs and two hind legs towards and across each other in the recognised manner.

Caesarean Section Operation

Sixty-nine ewes were operated on during the period 1947 to 1956 and the foetuses delivered by caesarean section. The indications for the operation were:—

(a) Failure of cervix to open sufficiently for manipulation and/or delivery of lamb.

(b) Small vagina and pelvis with foetus relatively large and/or malpresented.

(c) Some cases of protracted labour with genital tract dry and uterus clinging to a malpresented large or emphysematous lamb.

(d) Some cases where the owner or shepherd had unsuccessfully attempted delivery and bruised the vagina and/or cervix.

The surgical technique for caesarean section in the ewe has been fully described in the literature and the present writer will only mention a few points of general procedure.

In site preparation shearing and shaving were found to be preferable to plucking the wool as the latter method left an obvious sore skin. All the cases were operated on using local anaesthetic, approximately 30 c.c. of 5 per cent. procaine hydrochloride by infiltration proving satisfactory. The lower right flank, lower left flank, and the midline approach were experimented with. The latter site was found to be more satisfactory because with a midline incision the prominent veins that run on the lateral aspect of the abdomen were avoided and far less trouble was experienced in keeping the bowel in the abdomen compared with that experienced when using the dorso-ventral lateral sites.

It was observed that involution of the uterus was rapid in the ewes following removal of the foetuses and consequently the incision in the cornu sometimes became out of apposition with the abdominal incision. For this reason the latter was kept as far back as the udder allowed.

Continuous No. 1 or No. 2 catgut single Lambert suturing was used for the uterus and No. 2 or No. 3 catgut interrupted suturing for the peritoneum and muscle layers, whilst No. 6 nylon interrupted suturing was used for the skin. After treatment was given only in cases of uterine infection and consisted of the routine outlined for infected cases delivered *per vaginam*. During the period 16 infected cases died within 24 hours of operation.

Normal Lambing

Owners were encouraged to leave sheep to lamb at the writer's premises when they had brought them in with other complaints and lambing was imminent. Advantage was taken of this routine to observe the normal process of parturition in the ewe. The sheep were let loose in a sheltered grass run. During the period lambing was observed or partly observed in twenty sheep, an average of two each year. The ewes varied, possibly according to individual temperament and age, in their early lambing symptoms. Some were restless, getting up and lying down as if in mild colic for an hour or so before the foetal membranes appeared, whilst in others, especially the older ewes, the first apparent sign of parturition was the appearance of the waterbag or the fore feet and muzzle of the lamb. If not already lying down the ewes lay down at this stage. The waterbag ruptured, usually within ten minutes of its appearance, and the ewes then began to strain.

In the early stage of actual labour, the duration of which varied from fifteen minutes to two hours, the ewe remained lying on its belly, but as labour became intensified or protracted, it rolled on its side and remained thus, only raising its head skywards occasionally.

The presentation in the ewes observed was what is regarded as normal, fore feet appearing with the muzzle following approximately one inch behind the tip of the digits. Fourteen of the ewes took about 15 minutes to negotiate the head out of the vulva and then the foetus was delivered in another 5 to 10 minutes. In 3 cases help was given before the head of the foetus was delivered and in 3 cases after the head had been delivered, as no permission had been sought to experiment with these ewes.

Lambs suckled in approximately one hour after birth and the placenta was voided in 2 to 3 hours in 8 ewes that were observed.

Discussion. Wallace (1949) records that in the course of an investigation "the longest interval which elapsed between a lamb being seen and its unassisted birth was one hour and forty-five minutes.

This lamb was born dead, but other unassisted lambs were delivered alive after intervals ranging up to one hour and forty minutes." He adds that a number of lambs which had been visible for 2 to 3 hours were finally assisted and born alive.

In the writer's limited observations, no special time of day was associated with normal lambings, but Wallace (1949) states that "there is a suggestion that more ewes tend to lamb between midnight and 4 o'clock in the morning than during any of the other four-hour periods," and that "approximately 70 per cent. of the lambs (in an investigation, totalling 275) were delivered . . . in the correct manner."

Bennetts (1944) associates a specific type of dystocia, namely "the non-evidence of the usual signs of lambing and the death of the full-term foetus" in the merino ewe with dominance of the pasture in Australia with early subterranean clover. The actual cause has not been determined; it appears not to be of infectious origin and there seems to be "some factor in addition to high bodily condition (and unduly large lambs) which prevents normal labour in the ewe."

Oestrogenic substances have been identified in Australian subterranean clover and in pasture herbage in England. Edgar (1952) citing Bennetts and others (1945) and Bartlett and others (1948).

It is an accepted fact that a live foetus is an influencing factor in the production of normal vigorous labour in all animals and anything, be it malpresentation or the nature of the food eaten, that causes death of the foetus will, indirectly, tone down the normal signs of lambing and the intensity of the labour. The writer has observed this substandard labour in ewes brought to him with malpresented dead foetuses.

Bassett and Phillips (1955) have investigated by dissection and radiography the physical changes that normally occur in the ewe's pelvic region during pregnancy and parturition. They record that no change occurred in the pubic symphysis but, commencing between the second and third month of gestation, relaxation of the sacro-iliac joints and elongation of the sacro-sciatic ligaments occurred. This relaxation gave a maximal pelvic outlet at the time of parturition while the pelvic inlet remained unchanged. The sacro-lumbar joints also appeared to become more flexible. The uterine ligaments and the attachments of the reproductive tract in the pelvis elongated and thickened and "the vagina increased significantly both in length and circumference" starting at about the fourth month of gestation.

The pouches of the pelvic peritoneum and the muscles and ligaments of the retroperitoneal part of the pelvic cavity and perineum were also involved in the general relaxation of soft and bony tissues during advancing gestation.

Retention of Placenta

Retention of placenta for more than a few hours was not encountered in ewes lambing at full time except in association with cases of inversion of the uterus (see later). There were a few instances each year of owners seeking advice on retention of placenta in one or two ewes that were believed to have lambed prematurely. As a prophylactic, sulphanilamide by mouth was prescribed successfully in these cases.

Vaginal Prolapse

Each year an average of 2 cases of vaginal prolapse were seen and treated, a total of 20 cases during the period. These were all ewes in good bodily condition that subsequently lambed twins and which suffered from the complaint during the last ten days of pregnancy.

The prolapse in each case consisted of vagina and cervix and was red and swollen. The mucous surface was contaminated from the tail and often from the ground as the ewe had been lying down straining and giving the impression to the shepherd that it was trying to lamb.

Treatment. With the ewe on its side the perineum is cleaned and the prolapse washed with warm water containing 1 in 20 dettol and dusted with sulphanilamide. Then, with the ewe held by its hind legs in the suspended position described for lambing, the vagina, with very little pressure, falls back into place. The vulval labiae are infiltrated with a little local anaesthetic and three nylon (No. 6) sutures inserted deep, but not tight, across the vulva. The owner is instructed to set the sheep free on its home ground, to watch it carefully for signs of imminent lambing and to cut the sutures only when these signs are noticed. It is realised that, except in the odd case in a flock, this procedure perhaps would not be a practical proposition, but in the cases the writer dealt with it worked out satisfactorily.

The ewes recovered, lambed themselves, and did not suffer from a relapse of the prolapse after lambing. They were not kept again for mating on account of the risk of relapse when pregnant.

Walsby (1952) includes prolapse of the cervix, before and during labour, as an indication for caesarean section, but adds that an attempt to return the prolapse, if only for a time, is well worth while.

Discussion. In each of the cases seen there was a history of supplementary feeding with roots and/or hay. Such feeding, with the resultant lying down for longer periods than when the sheep had to depend on grazing alone is possibly, in a susceptible case, a predisposing factor, if not a causal factor, in the condition. Bassett and Phillips (1955) state that "ewes are more likely to develop prolapse first when lying down." They record observing with a speculum, mud and grass on the cervices of ewes which later developed vaginal prolapse or so-called "bearing trouble," and they suggest that in these ewes transient prolapse had occurred before development of the acute condition. In a study of the pelvic anatomy of normal ewes and ewes with "bearing trouble," or with history of "bearing trouble," they found several differences in the two groups. In the "bearing trouble" ewes, both pregnant and dry ones, the attachments of the reproductive tract in the pelvic canal tended to be longer and the vagina and perineal tissues more relaxed. While the sacro-lumbar joints of "bearing" pregnant ewes tended to be stiffer, their sacro-iliac joints tended to be looser than

those of the normal ewes. It was found that the pelvic peritoneum influenced the horizontal movement of the reproductive tract. The authors observe that most ewes with vaginal prolapse carry twins and that internal volume must be a contributing cause of the condition but in their investigation they did not find marked changes in the abdominal pressure in standing ewes but say they would expect it in ewes lying down.

Bennetts (1944) says that vaginal prolapse "is ascribed to excessive straining in unsuccessful attempts to pass urine." Fat, sluggish ewes, heavy in lamb are said to "delay urination until a number of factors, including pressure of the heavy womb on the bladder render the act difficult or impracticable."

The effect of hormones on the development of vaginal prolapse is not yet clear. Bassett and Phillips (1954) state that experiments on guinea-pigs and mice have shown that changes in pelvic joints are controlled by the hormone relaxin in association with the steroid sex hormones, and that they, the authors, have shown that relaxin is present in ewes' ovaries and blood. They refer to other work having shown that there is an increase in the excretion in the urine of oestrogens and androgens by pregnant ewes at about the third month of gestation when relaxation of the pelvic tissues normally begins. Edgar (1952) found no vaginal prolapse in a group of 24 ewes being treated solely with implantations and oral administration of diethyl-stilboestrol. An injection of pitocin to 9 of these ewes resulted in one ewe in poor condition, and on which an abdominal belt had been fitted to increase the abdominal pressure, partly everting its vagina, and the condition persisted for some weeks until the ewe was slaughtered. All the stilboestrol-treated ewes showed relaxation of the attachments of the genital tract and of the pelvic joints. It appeared to the author that possibly oestrogen treatment stimulated the adrenal cortex to secrete androgens.

It appears therefore that there are several factors responsible for the development of vaginal prolapse.

Prolapse and Inversion of the Uterus

Each year an average of 3 cases of the above condition were seen and treated, a total of 30 during the 10-year period. In 19 instances the ewe had lambed itself but there was little information available as to the time taken to lamb, or of the presentation, but the owners said that the lambs were relatively large in size. In 11 cases delivery had been protracted and had been assisted by traction by the shepherd. In 16 cases the foetal membranes were still attached to the uterus. All the ewes were able to stand and walk and did not seem to suffer from the same amount of shock as do cows. Some of the uteri were inverted to three-quarters of their length, and others were completely inverted. All were soiled and swollen with the surface of the uterine body and cotyledons in varying stages of inflammation. In the early cases it was highly inflamed and bright red, whilst in the late ones of approximately 2 days' standing it was yellowish red and contaminated. The whole organ measured up to 9½ inches in length and 4½ inches in width.

Treatment. The perineum is cleaned. The uterus is washed with warm water containing 1 in 20 dettol, and the foetal membranes, if attached and ripe, removed carefully. The uterus is then dressed with penicillin in oil (3 × 100,000 I.U. intramammary tubes) and sulphanilamide powder, and replaced with the ewe held by its hind legs in the suspended position. The organ falls fairly easily into the vagina with a little careful kneading. The hand is then oiled and inserted into the vagina so as to replace the uterus into the abdomen. With two fingers through the cervix the uterus is moved backwards and forwards in the abdomen to undo the inversion completely. A penicillin-streptomycin pessary is inserted in the uterus and the vulva is then sutured with nylon (No. 6) as described for vaginal prolapse, and these sutures are removed in 6 days. In an infected case the after-treatment described for infected lambing cases is prescribed.

All the cases dealt with made a good recovery.

Bennetts (1944) records prolapse of the womb occurring some months after the lambing season in Merino and cross-bred ewes on dominant subterranean clover pastures in Australia. The condition, which at first appears as a "protrusion of an inflamed, red, knobby swelling," deteriorates until in 2 to 3 weeks the uterus is almost completely inverted. The author adds that "affected sheep are usually slaughtered when found. If not they may survive for months or die from infection, toxaemia, or from the effects of rupture of the prolapsed womb. . . Attempts at replacement of the prolapsed organ, and its fixation in position by various methods by sheep owners, are not generally successful."

This type of uterine prolapse is a special one, apparently only associated with the sheep grazing subterranean clover which, as already mentioned, contains oestrogenic substances. No reference was found in the literature to the causes of uterine inversion and prolapse which occurs immediately or soon after lambing. The predisposing factors might well prove to be the same as for vaginal prolapse, with the exciting factor of some physical discomfort or unfavourable mechanics associated with separation and expulsion of the placenta.

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News and Comment

THE JOINT MEASUREMENT SCHEME

By arrangement with the promoters of the Joint Measurement Scheme it is proposed to publish, from time to time, details of ponies which have been found to be overheight after remeasurement under the rules of the scheme.

During 1958 there were 5 remeasurements, of which only 2 were found to be overheight. The first was a show pony, "Foxfire," formerly called "I Can." This was a chestnut mare, foaled in 1949 with blaze, snip and mane, white saddle-marks, and white pasterns and fetlocks on near fore, near hind and off fore. At the time of the remeasurement it was owned by Mr. Newell, of Trotshill Farm, nr. Worcester. The second remeasurement was a small hunter, "Morn Cross," the property of Miss E. Osborne, Pool House, Weston Jones, nr. Newport, Salop. A bay gelding, 6 years, with star and white pasterns, near and off hind.

INTERNATIONAL CONTROL OF TICK-BORNE DISEASES

The 77 member countries of FAO have always attached great importance to the control of animal diseases. Foot-and-mouth disease, rinderpest, brucellosis, pleuropneumonia and Newcastle disease, are all highlights in FAO's programme of work, and significant results have already been achieved through international co-operation in the control of such diseases.

Veterinarians and other specialists from Argentina, Australia, Colombia, Denmark, Egypt, France, German Federal Republic, Italy, Korea, Lebanon, Mexico, Netherlands, New Zealand, South Africa, Spain, Sudan, Turkey, United Kingdom, United States and Yugoslavia, participated in a first meeting in Rome in July, 1957. This meeting was held to provide a free exchange of information on the control of tick-borne diseases and it was decided to set up a small group of experts for the purpose of advising FAO on these diseases. The group is composed of experts from Australia, Germany, Iran, Portugal, South Africa, United Kingdom and the United States. The first objective is to accumulate all new knowledge in the field of tick-borne diseases, giving indications on deficiencies in knowledge and assistance towards research. This would help veterinary authorities to draw up and implement control measures over the whole world, and would also serve the purpose of controlling tick-borne diseases which are transmissible to man. The expert panel is to hold its first meetings from November 24th to 29th, at the Royal College of Veterinary Surgeons. For further particulars readers are invited to apply to the Registrar of the Royal College, 9 and 10 Red Lion Square, London, W.C.1.

PERSONAL

Birth

HANDS.—On November 13th, 1958, to Joan, wife of Roy R. Hands, B.SC., M.R.C.V.S., of Sutton Coldfield, Warwicks, a son, Roger Stuart, brother for Christopher.

THE R.C.V.S. TRUST

We are happy to announce the first two magnificent benefactions towards the work of the Trust in advancing veterinary post-graduate education.

British Oil and Cake Mills Ltd. propose to establish a "B.O.C.M. Fellowship" of £1,000 per year for an initial period of 3 years.

Boots Pure Drug Co. Ltd. propose to establish a "Boots Research Scholarship in Veterinary Science" of £750 per year for an initial period of 3 years.

The final arrangements have yet to be made between the Companies and the Trust, and in an early issue we shall give further details of these awards together with a note on the objects of the R.C.V.S. Trust.

COMING EVENTS

November

26th (Wed.). General Meeting of the Lancashire Veterinary Association at the Veterinary Hospital, University of Liverpool, 2.30 p.m.

27th (Thurs.). Annual Dance of the V.V.B.F. North of Scotland Division in the Northern Hotel, Aberdeen, 7.30 p.m.

Meeting of the Essex Veterinary Society at the Essex Institute of Agriculture, Writtle, Essex, 7.30 p.m.

28th (Fri.). Annual General Meeting of the North Wales Division at the Gwydyr Hotel, Bettws-y-Coed, 2.30 p.m.

Ordinary General Meeting of the Royal Counties Veterinary Association at the Caversham Bridge Hotel, Reading, 2.30 p.m.

December

2nd (Tues.). Meeting of the Lakeland Veterinary Association at the George Hotel, Keswick, 6 p.m.

3rd (Wed.). Meeting of the B.S.A.V.A. Midland Area at the Midland Hotel, Derby, 1.30 p.m.

Annual General Meeting of the Scottish Branch at the Glasgow University Veterinary Hospital, 2.30 p.m.

4th (Thurs.). Ordinary Meeting of the Ayrshire Veterinary Association in the Ailsa Lounge, The Station Hotel, Ayr, 2.30 p.m.

Meeting of the Southern Counties Veterinary Society at the Polygon Hotel, Southampton, 8 p.m.

5th (Fri.). General Meeting of the Lincolnshire and District Division at the Grand Hotel, Peterborough, 2.15 p.m.

General Meeting of the Lincolnshire and District Division at the Grand Hotel, Peterborough, 2.15 p.m.

General Meeting of the South Wales Division at the Park Hotel, Cardiff, 2.30 p.m.

12th (Fri.) Annual Dinner-Dance of the North of England Veterinary Medical Association in the Three Tuns Hotel, Durham, 7.30 p.m.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

*Glouc*s. Mill Farm, Horton, Bristol (Nov. 11).

Fowl Pest

Ches. Florida Bungalow, Antrobus, Northwich; Birchall Gorse, Appleton, Warrington (Nov. 11).

Hunts. 14, Old Court Hall, Godmanchester (Nov. 16).

Lincs. 9, Council Houses, Marston, Grantham (Nov. 13); Manor House, Hougham, Grantham (Nov. 17).

Norfolk. Nissen Huts, Deopham, Wymondham; The Lodge, Morton on the Hill, Attlebridge, Norwich; Manor Farm, Ickburgh, Thetford (Nov. 12); The Firs, Upton, Norwich (Nov. 14).

Surrey. Ladygrove Farm, 20, Selsdon Park Road, Selsdon (Nov. 12).

Worcs. West View, Worms Ash, Bromsgrove (Nov. 11).

ADVERTISER'S ANNOUNCEMENT

THE DISTILLERS COMPANY (BIOCHEMICALS) LIMITED announces that the following veterinary products are no longer available: "Distule" PP 100 (Cartons of 10 and 100), "Distule" PP 300 (Cartons of 10), and "Distule" PS (Cartons of 10).

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

The R.C.V.S. and the B.V.A.

Sir,—In THE RECORD dated October 11th, there appeared a letter from Mr. J. R. Mitchell, entitled "A Tribute from Canada." Mr. Mitchell is indeed right to be proud of his association with the R.C.V.S. and B.V.A., whose members are actively engaged in promoting the welfare of animals, stockowners, meat packing industries, and the customers of these industries, all around the world. Nevertheless, this does not alter the fact that all is not well with the veterinary profession in the United Kingdom. It is very noticeable that Mr. Mitchell complains of criticism only in vague generalised terms, and does not attempt to take issue with me on any specific point mentioned in my letter published in THE RECORD on August 30th.

In a free society, the right to criticise persons and/or institutions is the prerogative of every individual, otherwise we shall be in the same position as those unfortunate beings behind the Iron Curtain. I feel sure Mr. Mitchell would not approve of such a state of affairs. As a matter of fact, the B.V.A. had already adopted one of my suggestions, even as my letter was in the mail, according to an editorial footnote to that letter; namely, that a professional secretary will be engaged, who will be active in public relations work for the profession.

Mr. Mitchell says he is prepared to answer any constructive criticism of the effective control of animal diseases in the United Kingdom. Such constructive criticisms have already been clearly implied in my letter published in THE RECORD, May 10th, namely that the measures for animal disease control which have been found effective overseas by many years' experience, should be introduced at home.

Yours faithfully,
J. N. SIMPSON-WHITE.

9629, San Luis Avenue,
South Gate, California.
November 9th, 1958.

Control of Milk Production—England and Wales

Sir,—Having been taken to task by Mr. Atkinson for failure to appreciate the efforts made by the B.V.A. in connexion with the implementation of the findings of the Arton-Wilson Committee on the control of milk production in England and Wales (*Vet. Rec.* **70.** 864), let me explain that my request for a frank report was prompted by something other than the wish to criticise.

My difficulty has been to find anything in the recorded reports that could be taken as a convincing and logical argument for the rejection of a recommendation of a committee of the standing of that with which we are concerned, and Mr. Atkinson's quote from the Ministry's letter surely reads more like an excuse than a reason.

Despite this, however, the stark fact is that it happened and, as it was the second time, common sense as well as the old gag about "anybody but a fool" should make us ask seriously "Why?" In this connexion it is well to remember that the rejection of the profession from a duty that had been accepted as rightly coming within its sphere was not an isolated act; others come readily to mind. It would appear fairly obvious, therefore, that our natural professional aspirations are not viewed sympathetically in official and some other circles and the possible explanation may be ignorance of, or failure to, accept the readily proven fact that in dealing with farm animals veterinary surgeons have undertaken a training longer and more comprehensive than that of any other group.

If a study of the discussions on the relevant findings of the Arton-Wilson Committee can give a clue to the reason for the official attitude, then I believe it to be worthy of the attention of all members of the B.V.A.

Yours faithfully,
JOHN C. GRANT.

Veterinary Department,
Marischal College,
Aberdeen.
October 29th, 1958.

Accidents Associated with Anaesthesia

Sir,—Since August, 1957, I have given epidural injections to 26 adult sheep, both to facilitate obstetrical manipulation *per vaginam* and preceding reduction of prolapsed uteri. The injection site used was at the lumbo-sacral junction and the maximum volume of anaesthetic used was 7 c.c. (Ravocaine, Bayer). The majority of these animals were seen in the Lake District, some being on the fells where the

most practical way of warming the anaesthetic solution was to keep it in a trouser pocket.

Of the 26 sheep attended, 4 died within 24 hours; 3 of the remainder suffered from a transient unilateral hind leg lameness, but none of the survivors suffered from any permanent defect in locomotion. The 4 which died had all suffered from uterine prolapse, but also, at the time the epidural injection was administered, there had been a flow of cerebrospinal fluid into the needle. The needle was withdrawn until the flow ceased and the injection then given.

It may well be impossible to draw firm conclusions from such a small number of cases, but perhaps the unfortunate sequel of permanent lameness observed by Dr. G. B. Brook was absent due to (a) only a small volume of fluid being injected, and (b) the meningeal sac not being punctured.

Yours faithfully,
G. A. OAKLEY.

24, Darthill Road,
March,
Cambs.
November 13th, 1958

Navicular Disease

Sir,—Since the X-ray department of the Glasgow veterinary hospital commenced to function a number of years ago, I have had occasion to send many horses suffering from undefined foot lameness for examination. Almost without exception the report received gave a diagnosis of navicular disease. In fact, this diagnosis was so regular that I admit I became dubious of the interpretation placed on the plates by Mr. S. Jennings, M.R.C.V.S.

With the passage of time, however, it has become clear that in every case which I was able to follow, he was perfectly correct in his interpretation. As a result of my experiences I am now satisfied: that navicular disease is much more common than I ever thought it was; that, with the use of X-rays, it can be diagnosed by an experienced interpreter at a very early stage; and that the clinical symptoms described in the majority of text-books are, in many cases, incorrect unless cases are very advanced.

Yours faithfully,
A. H. ROBB.

16, Ward Street,
Glasgow, C.4.
November 17th, 1958

Distemper Complex

Sir,—In view of the repeated reports, and cases seen, of distemper in older dogs I am prompted to write this letter in the hope that views from other veterinary surgeons may be forthcoming. Despite all the work that has been done our old enemy distemper appears to be still with us.

Within recent years a new method of vaccination against distemper has come into vogue and has a large following. It consists of the adaptation of the distemper virus to the chicken embryo and is called "avianised vaccine." Excellent results have been obtained from its use and it is claimed that there are no visible or systemic reactions to such a method of vaccination.

One must remember, however, that this vaccine, although reduced in virulence is still alive, and therefore may be difficult to control when once introduced into the animal body. There is a school of thought that believes any such vaccine should be killed, and those holding this belief are commencing to get a larger following.

During recent years there have been many excellent papers on this subject, but in view of the recent apparent lessening of the disease in this country the subject has not, perhaps, excited as much interest as it deserves.

In point of fact the picture is far from clear and indeed it might be more true to say that it is full of confusion. Papers have been written suggesting various strains of the distemper virus and this theory is supported by outbreaks of the disease often spoken of as "hard pad disease." Until it is otherwise proven the writer feels that all the various clinical syndromes including "hard pad disease" are all caused by the distemper virus, or variations of it.

The problem of immunisation is still far from being satisfactorily solved, even though it is admitted that any known form of vaccination cannot be expected to prove one-hundred per cent. successful. In the early days of the Laidlaw and Dunkin method of immunisation one did expect to get about 95 per cent success plus a very long-lasting immunity, and any break-downs were seen very largely, if not entirely, in young animals.

To-day the picture is somewhat different. Many dogs are seen with neurological symptoms but without any previous history of illness prior to their onset, except in some cases where there has been a history that the dog has been off colour some 5 or 6 weeks previously. In some cases the animal has been vaccinated about the same period previous to the manifestation of neurological symptoms.

It would appear to-day that immunity, whether following natural infection or resulting from vaccination, is in many cases of comparatively short duration, and that its length is governed by the frequency with which the animal comes in contact with natural infection.

It must be emphasised that all recent evidence suggests that distemper is no longer a disease of the young dog but can, and does, attack middle-aged and even old animals.

From the purely clinical point of view the nervous manifestations so frequently seen to-day can be classified as follows:—

1. Those showing systemic symptoms only.
2. Those showing systemic symptoms complicated by neurological symptoms.
3. Those showing neurological symptoms only.

The apparent dearth of distemper at the moment may be due to the ever-increasing number of dogs being vaccinated, or to the fact that the present form of the virus is of a low virulence; it may be a combination of both factors.

What of the future? Already there is evidence to suggest that all is not quite as well as we should like to think, and for this reason those responsible for research on this problem cannot afford to rest on their laurels. In America the avianised vaccine

was in use some 2 or 3 years before it was adopted in this country, and according to reports reaching us from across the Atlantic, the situation over there is far from being entirely satisfactory.

Yours faithfully,
S. F. J. HODGMAN.

Canine Health Centre,
Kennett,
Nr. Newmarket, Suffolk.
November 13th, 1958

"Tranquillising" for Shows

Sir,—Unless or until the Kennel Club co-operates in an attempt to improve brains and stamina of all breeds, I shall continue to prescribe "tranquillisers" for nervous show-dogs for the following reasons:—

One of our main functions is the prevention of suffering and it cannot be doubted that to dogs of a certain temperament a show is as much an ordeal as November 5th, or a long journey.

With or without our aid breeders will "acquire" or purchase without prescription certain forms of "tranquillisers" so it is surely preferable to supervise the administration of these potentially dangerous substances and so ensure that composition and dosage are correct.

Yours faithfully,
OLWEN D. JAMES

13, Australia Road,
Gabalfa, Cardiff.
November 16th, 1958

A Suggested New Feature

Sir,—Recently, it was suggested by Mr. Peck that many ideas, which are not supported by scientific facts, are a source of information and the precursors of fruitful work from which the profession grows. Whilst this is certainly true up to a point, it is necessary to see the dangers that are inherent in such a statement. Nowadays, one seems to be observing the growth of an unfortunate attitude which may be summed up in the phrase, "I'm a practical man and proud of it." This may, of course, be an attempt to fight against the impersonal age of the machine that is threatening us all, and a desire to retain one's individuality. This sentiment is admirable, but the occasionally observed results of "the practical man" can only be deplored in a profession which must be basically scientific in its everyday work from the laboratory to the practising veterinary surgeon.

So often, this so-called practicality is really an excuse for ignorance of what is known and of what can be observed in the field. If our profession is to increase in stature, we should have practical men who make scientific observations in the field, read the relevant literature where possible, and publish such information as will be valuable because it is scientific. It is well recognised in theory that impressions are misleading; but for some reason this is easily forgotten and eventually these impressions turn up as "facts." It is no wonder, then, that some relatively unsuccessful treatments have not changed over the last 50 years. One can read books published 30 or 40 years ago that are in very many ways far superior to anything that is published to-day. Those authors were perhaps fortunate in that they were not hindered by often rapidly acting, but not always efficient, drugs. They were then able to make and to publish scientific observations that are a pleasure to read because of their obvious accuracy and the carefully chosen way in which the facts are presented. Should anyone accuse me of worshipping science for its own sake, I would make the point that the dictionary defines the word "scientific" as being something that is systematic and accurate.

Mr. Peck is worried that many potential authors are shy of publishing information that is not scientinc. It is my sincere hope that, having regard for the future of the profession, they will remain in that state of mind.

Yours faithfully,
J. N. WRIGHT.

10, Chandos Avenue,
Whetstone,
London, N.20.
November 13th, 1958

Induction of Anaesthesia using Pentobarbitone Intrathoracically

Sir,—Dare I suggest that a simple and safe method of administering pentobarbitone is not necessarily either "haphazard" or "lackadaisical"?

We are all, I believe, conversant with aseptic techniques and I cannot see how Mr. Heath's argument on this score applies any more to one method than another.

With regard to injuring organs in the thorax I have never, to the best of my knowledge, had this misfortune; indeed I believe it would be difficult to do so using a needle of the proper length and gauge and a suitable site for injection.

I did not suggest that intra-thoracic administration should be used for other than cats or toy dogs and in the latter only if intravenous administration is difficult.

My method of approach and restraint with cats may be faulty, but I do find that in a proportion of cats, unless one actually ties them to the table, intravenous administration is difficult.

The duration of anaesthesia is, I agree, perhaps unduly long with pentobarbitone, but in this practice as spays are performed in the evening and the animal returned the following morning this does not matter.

In conclusion, may I suggest that we all as individuals judge ourselves, and are judged on results. It would be interesting to have the opinions of others who, like myself, adopt this "slovenly" technique; here's hoping other "slap-happy" and unprogressive individuals take the field.

Yours faithfully,
W. A. SCOTT.

49, Howbury Street,
Bedford.
November 15th, 1958

Sir,—I must deplore the tone of the letter from Mr. J. S. Heath, published in THE RECORD (*Vet. Rec.* **70**, 943). The words he uses to describe his fellow veterinarians, haphazard, lackadaisical and slovenly are hardly in keeping with his self-styled description of a "progressive member."

The correspondent who wrote to you describing the intra-thoracic method of anaesthesia did so to pass on the benefit of his successful experience to other practitioners who had not tried this method. Admittedly the method is not according to the text-book, but it is successful, simple and safe.

In my opinion we should encourage, not abuse, practitioners who are willing to pass on the " tricks of the trade " to less experienced members.

Yours faithfully,
V. A. HARRISON.

Derwent,
Church Street,
Matlock.
November 16th, 1958.

Docking of Horses

Sir,—We must be prepared to exercise further pressure to stop this cruel and pointless practice. If anyone believes in the theory that " it is necessary to dock draught animals, because it is dangerous when they get their tails over the reins " he should come to the annual shows in the Western Province of the Cape, where the high-light is wagon-driving in competition. In these events, teams of 8 horses and mules are driven in the show ring in long wagons at the trot, canter, and often at full gallop. At these speeds they execute sharp turns, the famous " Kaapse draai " (Cape turn) and pull up dead on a line. Any number of teams compete, there often being 8 eight-horse teams in the arena at once.

It is a great pity that they cannot come to the International Horse Show as they would undoubtedly bring the house down. The horses are generally black or light bay, the harness is white, and under flood-lighting they are a memorable sight. There is not a docked animal among them, and if anyone suggested docking as a " safety precaution " to the owners they would only laugh at the idea, as something too ridiculous to be considered seriously.

Yours faithfully,
J. K. THOMSON.

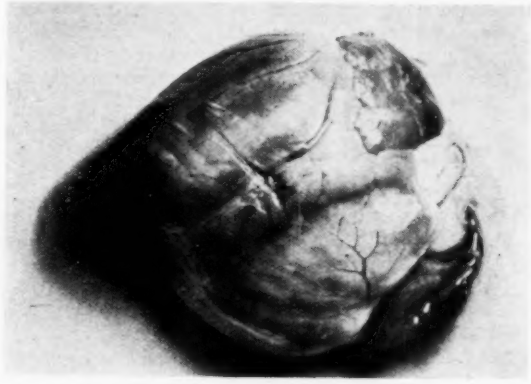
33, Riverside,
Pinelands, Cape Town.
October 22nd, 1958.

Acute Circulatory Failure in a Herd of Pigs

Sir,—I have read with great interest Dr. Goodwin's observation on herztod and mulberry heart, and would like to make the following comments :—

Herztod was first reported in 1910 (Opperman) and is essentially a disease occurring under peasant-farming conditions. It is also known as potato beri-beri. Hupka (1952) was able to induce the condition experimentally. Renk (1952-4), Rennert (1952), and Ahlswede (1953) also investigated herztod and concurred with Hupka that the condition was due to the excessive feeding of carbohydrates and to avitaminosis, the complaint occurring when the protein-starch ratio is in the region of 1 : 12.5. The presence of excess trace elements (*i.e.* zinc, or copper) in an unbalanced ration is also thought to be a factor (for instance, zinc vapour dispersing in the food during preparation in unsuitable and worn utensils). The addition of fish-meal to the ration brought outbreaks to an end and stopped all further trouble.

From my limited experience of mulberry heart, which I summarised in *The Farmers Weekly* (July 19th, 1957), I would say that this condition seems to occur only in herds enjoying above-average, progressive management. Of the 4 outbreaks known to me in the early part of 1957, 3 occurred in pure Landrace herds, while the fourth concerned Wessex Saddleback X Large White crosses. In all cases, nutritional causes must be ruled out, but it is possible that management was too intensive for these particular strains and this in turn gave rise to the theory that the condition is possibly hereditary.



I enclose 2 photographs of herztod hearts, obtained from Hanover last year, fully aware that diagnostically they are not of great value.

Yours faithfully,
FREDERICK VOGT.

North Tuddenham,
Norfolk.
November 15th, 1958

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